A Lachnea with a botryose conidial stage

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(WITH SEVEN TEXT FIGURES)

While engaged in culturing species of Discomycetes for the purpose of studying the nature of the origin of the ascocarp, an interesting *Lachnea* was collected several different times in 1912 on a variety of substrata in the vicinity of New York City. The apothecium of this fungus, which was identified* at the time as *Lachnea abundans* Karst., originates in a long winding multicellular ascogonium, so similar to that described by Fraser† for *L. cretea* that, when we consider also the characters of the fruit bodies and mycelium, there appears to be little doubt that the fungi with which both of us were working are at least very closely related species. Believing that the characteristics of the primordia are of fundamental importance in determining relationships, further discussion, other than the mention made in a paper published at that time,‡ seemed unnecessary.

Miss Fraser does not state that she grew *L. cretea* in pure cultures. Her cultures were originally derived presumably by transfers from a plate culture overrun with moulds and some hyphomycetous fungus. It would be necessary to know whether *L. cretea* has a conidial stage like that which we have connected with *L. abundans* before we can be certain that the species are identical. In view of the discussions that have arisen since the publication by Seaver and Horne* of a paper on *Sclerotinia Geranii* and another paper by Godfrey† on *Sclerotinia Ricini*, both of these forms having *Botrytis* conidial stages, it has been thought advisable to point out that there are other types of Discomycetes which also have asexual fructifications closely resembling *Botrytis*.

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* The identification has been confirmed by Dr. F. J. Seaver, who is considering *L. cretea* as a possible synonym.

† Ann. Bot. **27**: 553–563. 1913.

‡ Bull. Torrey Club **41**: 165 1914.

* Mem. Torrey Club **17**: 202–206. 1917.

† Phytopathology **9**: 565–567. 1919.

The conidia of *Lachnea abundans* are smooth at maturity while those of *Sclerotinia Geranii* are rough or warted, otherwise their conidial stages are very similar. The connection between the apothecial and the conidial stage of *L. abundans* has been established repeatedly by cultures from single conidia and from single ascospores, apothecia arising in each case within a week or two after showing the spores.

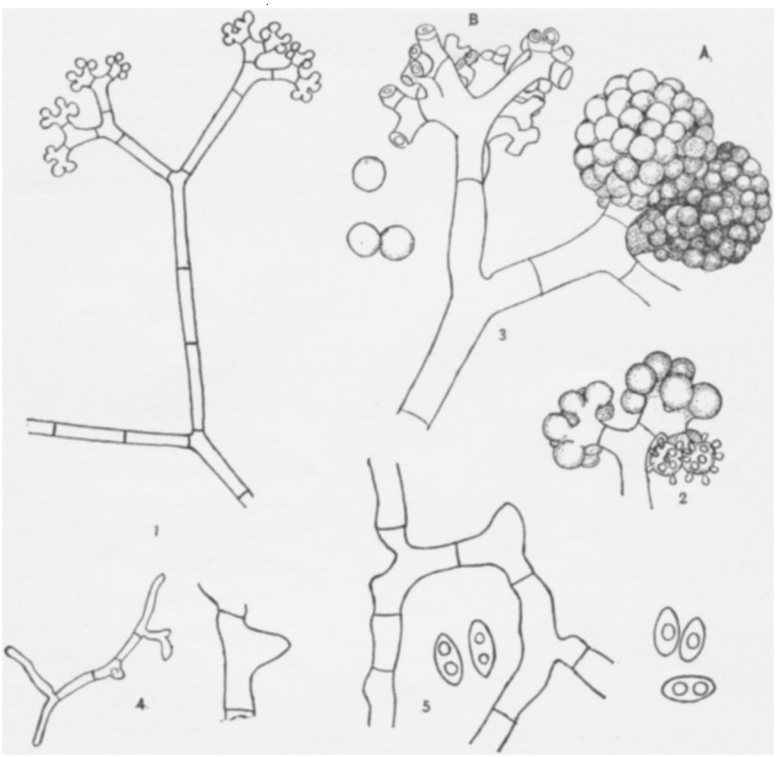


FIG. 1. Part of a dichotomously branched conidiophore showing the enlarged ends of the ultimate branchlets upon which spores will be borne.

FIG. 2. End branches of a similar stage more highly magnified, spore buds arising from two of the globular heads.

FIG. 3. Portion of an old conidiophore showing botryose clusters of spores, A, developed on about sixteen fertile ends; B, shows the collapsed ends of the conidiophore after the spores have been dislodged.

FIGS. 4 and 5. Germinated ascospore becomes a cell in the hypha; FIG. 5 also shows ungerminated ascospores.

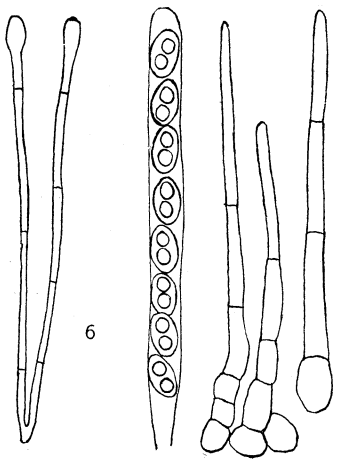
Ascospores germinate very readily when the inoculated culture

medium is heated to 70° C. for about fifteen minutes. This method has been found effectual in inducing germination of ascospores of certain other species of Discomycetes.‡ The outlines of the spore are generally obscured as it germinates and becomes a cell in the hypha (FIGS. 4, 5,). The conidia as well as the ascospores remain viable for a long time if kept dry in the laboratory, the former, sometimes living three or four years. Should several conidia be sowed together in a culture there follows at once a great amount of anastomosing of the germ tubes.

The fungus grows well on almost any of the ordinary culture media. Conidiophores arise the second day in cultures on milk, bouillon, potato agar, etc. An agar medium in which the nutrient is a decoction from heated soil is especially favorable for the development of ascocarps. A potato dextrose agar gives an abnormal amount of conidial development. The conidia are formed on the spherical or knob-shaped ends of regularly dichotomously branched conidiophores, seven or eight such divisions often occurring. One might consider an aerial hypha whose main axis ends in a pair of sporophores as a part of the conidiophore system even though branches ultimately bearing conidia arise at irregular intervals from it. FIG. 1 shows a branch of the third order at the time spore formation is just beginning. A portion of such a branch is further enlarged in FIG. 2, showing conidial buds from two of the ultimate branchlets. As spores mature they hang together in botryose clusters covering about eight pairs of end branches (FIG. 3, A). At B in this figure the conidia have been dislodged, exposing the extremities of the conidiophore subdivisions, now collapsed. The length of the conidiophore system and the number of times dichotomous branching occurs depend of course upon the kind of nutrient in the medium. On soil decoction agar the sporophores are very short, and there is very little of the aerial type of hyphae. The mycelial hyphae on the other hand branch more or less dichotomously and in this respect also the fungus is like the *L. cretea* studied by Fraser. The color of the aerial hyphae, conidiophores and conidia in mass varies from pale ochraceous buff to vinaceous buff (Ridgway), depending on age and vigor of growth.

‡ Mycologia **4**: 218–222. 1912.

The conidia are spherical, smooth, faintly colored, pale ochraceous buff in mass, 7–9 μ in diameter. The ascogonia begin to appear, as noted, in about ten days, and mature fruit bodies will be formed within two or three weeks. Fraser lays considerable stress on the branching of the trichogyne end of the ascogonium of *L. cretea*, thinking such vegetative growth the "progressive degeneration" of Atkinson, indicates that the species is becoming apogamous. Many such abnormal or aborted ascogonia are always found in cultures of these Discomycetes and they should be carefully distinguished from those



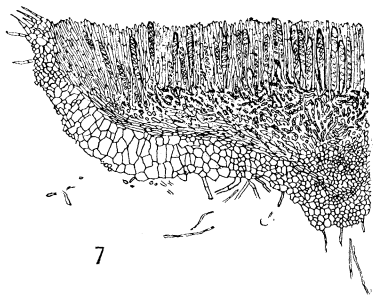


FIG. 6. Hairs from the margin of the apothecium, ascus with spores and paraphyses.

FIG. 7. Part of a section of a small apothecium showing the character of the cells of the wall and of the margin.

normal primoridia which develop into fruit bodies. Ascocarps of *L. abundans* (FIG. 7) are 1–3 mm. in diameter and uniformly ochraceous in color. The hairs (FIG. 6) are about 150 μ long, the asci 130–150 μ, and the ascospores 7–8 x 12–14 μ. The paraphyses, which are enlarged rather abruptly at the ends, are 4–5 μ broad.

It is certainly dangerous to place too much weight on the asexual spore forms in determining relationships of their ascogenous stages in the face of these apparently anomalous cases and such others as we find in *Ascobolus magnificus*, which is connected

with a *Papulospora** similar to those forms hitherto thought to belong to *Melanospora*. If one, following Saccardo, for example, seeks to find a description which might apply to the conidial stage of *Sclerotinia Geranii* or of *Lachnea abundans* he turns directly to the forms along with *Botrytis cinerea* on the basis of the spore clusters. It seems to the writer, therefore, an impossible task to determine the real generic affinities of species of form genera from a study of the conidial or pycnidial stages alone. Brierly* has recently published a paper on *Botrytis cinerea*. His argument is based entirely on the assumption that this species has no perfect or ascogenous stage. It is certainly unusual to state that a fungus has no ascocarpic stage simply on the basis of large numbers of cultures that produce only conidial fructifications. The recent work of Bensaude, Kniep and others, on several of the well known Basidiomycetes emphasizes the importance of growing in pairs strains or races derived from different spores, at least as a last resort, in attempts to obtain the "perfect" stages. We are finding more and more forms in which a strain, which is sterile when grown alone, still, when grown together with some other strain, at once takes part in the development of a "perfect" stage.

There is no question that *Lachnea abundans* is homothallic, a culture from a single conidium or a single ascospore being capable under suitable conditions of giving rise to ascocarps. Whatever may be the standing of the species now commonly referred to the form genus *Botrytis*, after study has revealed their ascomycetous connections, it is interesting to find an "imperfect" fungus with a botryose conidial stage connected with a little *Lachnea* which may be so easily cultured on ordinary media.

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* Mycologia **12**: 115–134. 1920.
* Phil. Trans. Roy. Soc. B. **210**: 83–114. 1920.